C 58252

(Pages : 2)

Name.....

Reg. No.....

FOURTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, JUNE 2009

PTCS CS 2K 403—THEORY OF COMPUTATION

Time : Three Hours

Maximum : 100 Marks

Part A

Answer **all** *questions.*

I. (a) State the pigeonhole principle. Give an example.

(b) What do you mean by regular expression ? Give an example.

(c) Define A context free grammar.

(d) Define a Push Down Automata.

(e) Explain the closure properties of context free grammar.

(f) List the properties of recursive and recursively enumerable languages.

(g) Explain why resolution is used in propositional calculus.

(h) State and explain Herbrand expansion.

(8 × 5 = 40 marks)

Part B

II. (a) (i) Explain countable sets and uncountable sets with examples. (5 marks)

(ii) Given the Language L as, $L:\left\{\left[(a+b)^* ab\,(a+b)^*\right] \cap L((ab))^*\right.$. Construct the DFA.

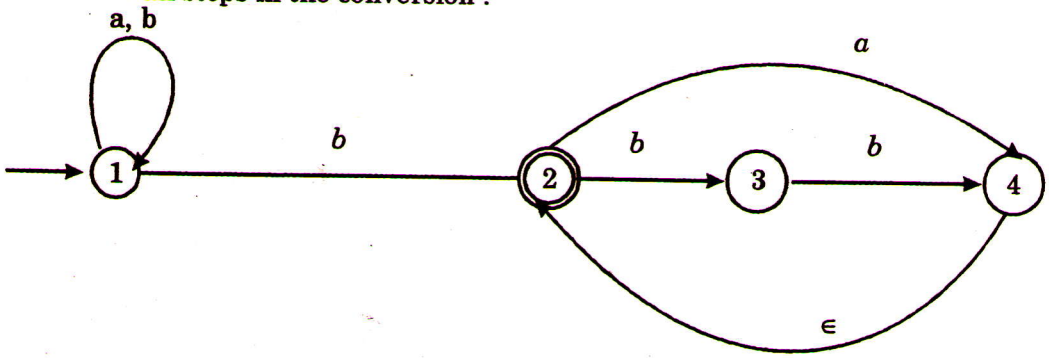
(10 marks)

Or

(b) (i) Explain Myhill-Nerode theorem. (8 marks)

(ii) Convert the following NFA to a regular expression :

Show all steps in the conversion :



(7 marks)

Turn over

III. (a) (i) Show that Post correspondence problem is unsolvable. (8 marks)

(ii) What do you mean by class P and class NP ? Give examples. (7 marks)

Or

(b) (i) Explain Ambiguous CFLs. Give examples. (8 marks)

(ii) Explain Cook's Theorem. (7 marks)

IV. (a) Explain pumping lemma with an example.

Or

(b) Explain the equivalence of LBA and CSG. (15 marks)

V. (a) (i) State and explain compactness theorem for propositional calculus. (8 marks)

(ii) State and explain Resolution theorem. (7 marks)

Or

(b) Find the Prenex forms of the following formulas :

(i) $\left(\neg \forall x\, P\, xy \vee \forall x\, R\, xy\right)$.

(ii) $\forall x\left(Px \rightarrow \neg \exists y\, Rxy\right)$.

Find functional forms of

$$\forall x \forall y\, \exists z\, \left((Pxy\ A\ PYZ) \rightarrow \neg PXZ\right).$$

(15 marks)

[4 × 15 = 60 marks]